REMARKS

Claims 1-49 are currently pending in the application. Claims 13, 14, 22, 25, 27, and 28 are amended to provide antecedent basis in the claims. Claim 49 is added for the Examiner's consideration. The amendments and new claim do not add new matter and are fully supported by the original disclosure. For example, support for the amendments and new claim is found in the claims as originally filed, FIG. 5, and at paragraphs 0107 through 0112 of Applicants' published application (U.S. Pub. No. 2006/0066841). Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Allowable Subject Matter

Applicants appreciate the Examiner's indication that claims 16-20 and 30-41 are allowed. However, Applicants respectfully submit that all of the claims are in condition for allowance for the reasons set forth below.

35 U.S.C. §112 Rejection

Claim 15 is rejected under 35 U.S.C. §112, 2nd paragraph. This rejection is respectfully traversed.

The Examiner notes that claim 15 recites "the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile" and asserts that it is unclear how this is done. The Examiner appears to be of the opinion that this recitation renders the claim indefinite. Applicants respectfully disagree.

According to MPEP §2173.02, the test for definiteness under 35 U.S.C. 112, second paragraph, is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 USPQ2d 1081, 1088 (Fed. Cir. 1986). Definiteness of claim language must be analyzed, not in a vacuum, but in light of: (A) the content of the particular application disclosure; (B) the teachings of the prior art; and (C) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

Applicants submit that claim 15 is clear and definite when read in light of the specification and with the knowledge generally available to one of ordinary skill in the art. The

features of claim 15 are described at least in paragraphs 0080-0082, 0095, and 0107-0111 of Applicants' published application (i.e., U.S. Pub. No. 2006/0066841). For example, in exemplary embodiments of the claimed invention, an image profile for a specified set of aberration values is calculated using response surfaces instead of performing a full simulation each time a new set of aberration values is received. More specifically, in embodiments, a setup phase involves performing full image simulations in order to create the response surfaces. However, this computationally intensive setup phase is only performed once, i.e., to create the response surfaces. After the setup phase, an image profile for a lens may be calculated using a specified set of aberration values and the response surfaces, without having to perform the computationally intensive full image simulation again. In this manner, implementations of the invention reduce the time and computation required in evaluating a new lens adjustment.

In asserting that claim 15 is indefinite, the Examiner appears to be reading the claim in a vacuum, without taking into account the description provided in Applicants' specification and/or the knowledge generally available to one of ordinary skill in the art. However, when claim 15 is interpreted light of the specification and with the knowledge generally available to one of ordinary skill in the art, rather than being read in a vacuum, Applicants submit that claim 15 is sufficiently clear and definite.

Accordingly, Applicants respectfully request that the §112, 2nd Paragraph, rejection of claim 15 be withdrawn.

35 U.S.C. §102 Rejection

Claims 1 – 6, 9 – 13, 15, 21 – 27 and 46 – 48 were rejected under 35 U.S.C. §102(e) for being anticipated by U.S. Patent No. 6,653,032 issued to Miwa et al. ("Miwa"). This rejection is respectfully traversed.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See, MPEP §2131. Applicants submit that the applied art does not show each and every feature of the claimed invention.

Independent Claim 1

The present invention relates to a method and system for reconstructing aberrated image profiles through simulation. In exemplary embodiments, a method involves constructing a description of the image profile that most easily allows rapid re-calculation of the profile when the lens aberrations are changed. The response surface description of changes due to aberration are also naturally well-aligned with tasks that would require optimization of aberrations, which are adjusted in practice by adjusting various optical elements within the projection lens. More specifically, claim 1 recites:

> 1. A method of calculating estimated image profiles implemented on a tangibly-embodied storage medium resident on one or more computing devices, comprising the steps of:
>
> providing imaging configuration characteristic data;
>
> performing simulation calculations for various levels for each aberration component using the imaging configuration characteristic data using a processor of the one or more computing devices;
>
> building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component;
>
> receiving specified aberration values of a lens; and
>
> calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations using the processor of the one or more computing devices.

The Examiner asserts that Miwa discloses the recited "building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component" at col. 3, lines 19-23 and FIG. 5. The Examiner asserts that Miwa discloses the recited "calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations using the processor of the one or more computing devices" at FIG. 5. Applicants respectfully disagree and submit that Miwa does not disclose all of the features of claim 1.

At the first passage identified by the Examiner (i.e., col. 3, lines 19-23), Miwa describes perceived problems with background prior art (i.e., Aida et al.). More specifically, Miwa states:

> In the approach for calculating the exposure energy and focus offset proposed by Aida et al., as mentioned above, it is possible to calculate the optimum values of exposure energy and focus offset due to differences in the illumination parameters of the optical projection system. However, to calculate the exposure energy and focus offset for a plurality of exposure devices is problematic: there are differences between the exposure devices, such as differences in the aberrations of the projection lenses, so that the response surface functions have to be produced and corrected for each exposure device. Furthermore, information regarding the circuit pattern is not taken into account, so that it is not possible to correct fluctuations of the exposure energy and the focus offset that depend on the circuit pattern.

(Miwa, col. 3, lines 13-27.)

Contrary to the Examiner's assertions, the above passage of Miwa does not disclose *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component*, as recited in claim 1. This passage does mention "response surface functions," however there is no disclosure that these response surface functions are based on a value of an aberration component. Instead, as pointed out in Applicants' previous response, the background prior art Aida et al. produces response surface functions of CD values and calculates exposure energy and focus offset from these response surface functions. The Aida et al. response surface functions are functions of CD (critical dimension) values. The CD values are not values of aberration components, and there is no mention in Miwa that the Aida et al. response surface functions have anything to do with a value of an aberration component. Therefore, lines 19-23 of col. 3 of Miwa do not disclose *building response surface functional relations ... wherein the response surface functional relations are based on a value of an aberration component*, as recited in claim 1.

The Examiner apparently recognizes that the above-noted passage describing the background prior art (Aida et al.) does not disclose response surface functions based on a value

of an aberration component, because the Examiner separately asserts that Miwa discloses "wherein the response surface functional relations are based on a value of an aberration component" at FIG. 5. However, the Examiner is clearly picking-and-choosing unrelated aspects of the Miwa disclosure in an attempt to reject Applicants' claims under 35 USC §102. It is well settled that an anticipation rejection requires more than just a mere disclosure of all elements in a claim:

> To anticipate, the reference "must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim.'" *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075 (Fed. Cir. 2008), (citing *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)); see also, e.g., *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972) ("[The] reference must clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference" (emphasis in original)).

In this case, the Examiner is improperly picking and choosing unrelated features from Miwa's background (i.e., the Aida et al. response surface function described in the Background at col. 3) and Miwa's invention (i.e., the data plot at FIG. 5). Miwa does not disclose that the response surface functions described in the background are based on aberration values, and Miwa does not disclose that the data plot in FIG. 5 has anything to do with the response surface functions described in the Background. It is improper for the Examiner to pick and choose unrelated features from Miwa's col. 3 and FIG. 5 in an attempt to formulate an anticipation rejection under 35 USC §102. Therefore, the combination of Miwa's col. 3 and FIG. 5 cannot reasonably be said to disclose *building response surface functional relations ... wherein the response surface functional relations are based on a value of an aberration component*, as recited in claim 1.

Furthermore, FIG. 5 alone does not disclose *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component*, as recited in claim 1. FIG. 5 shows two separate data plots of exposure energy versus focus offset.

The first one of the data plots, e.g., FIG. 5 (1), shows exposure energy versus focus offset without aberration. The second one of the data plots, e.g., FIG. 5 (2), shows exposure energy versus focus offset with third-order spherical aberration for 0.05λ. The entirety of FIG. 5 and the Miwa's description of FIG. 5 are reproduced below:

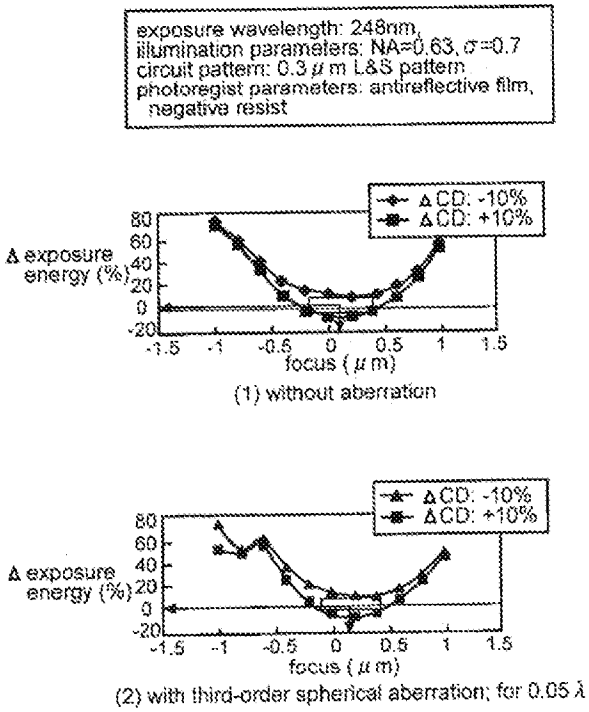
> FIG. 5 is a diagram illustrating the variations of the process windows due to different aberrations of the projection lenses;

(Miwa, col. 5, lines 13-15.)

> FIG. 5 shows the fluctuation of the exposure energy and the focus offset due to different aberrations of the projection lenses as simulated with an optical development simulator. In the case of spherical aberration, the optimum value of the focus offset fluctuates more than without aberrations. Without aberration, the exposure device has to be corrected by an offset of 0.1 μm, and with an aberration of 0.05λ, the exposure device has to be corrected by an offset of 0.2 μm.

(Miwa, col. 6, lines 60-67.)

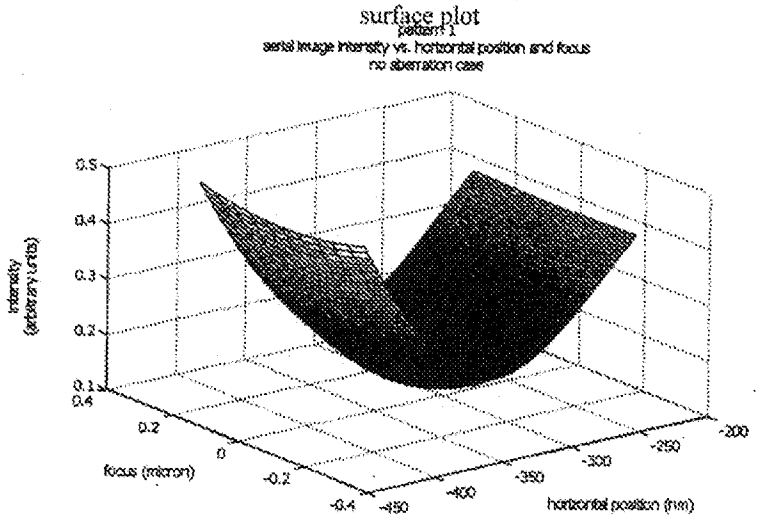
FIG.5



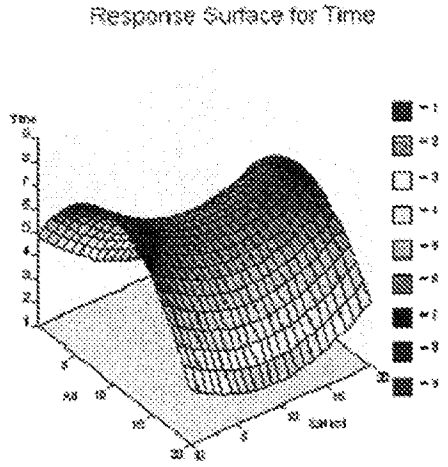
Miwa's FIG. 5 does not show or otherwise disclose response surface functional relations between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component. In fact, Miwa's FIG. 5 is not even a response surface functional relation. Instead, FIG. 5 is merely a line-chart of exposure energy versus focus.

One of ordinary skill in the art would readily recognize the difference between: (i) a "response surface" as the term is used in Applicants' claims and specification and (ii) a line-chart as shown in Miwa FIG. 5. For example, Applicants' FIG. 2 (reproduced below) shows a response surface generated in accordance with aspects of the invention.

fig 2 aerial image intensity vs. horizontal position and focus surface plot



As another example, http://www.pqsystems.com/products/sixsigma/DOEpack/DOEpack.php shows a response surface as follows:



It is evident from Applicants' disclosure and also from the knowledge generally available to one of ordinary skill in the art (e.g., the above-noted website) that Miwa's FIG. 5 is not a response surface. Miwa does not describe the graph in FIG. 5 as a response surface, even though Miwa clearly knows what a response surface is based upon Miwa's Background. Therefore, Miwa's FIG. 5 does not disclose *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component*, as recited in claim 1, and Miwa cannot reasonably be said to anticipate the claimed invention.

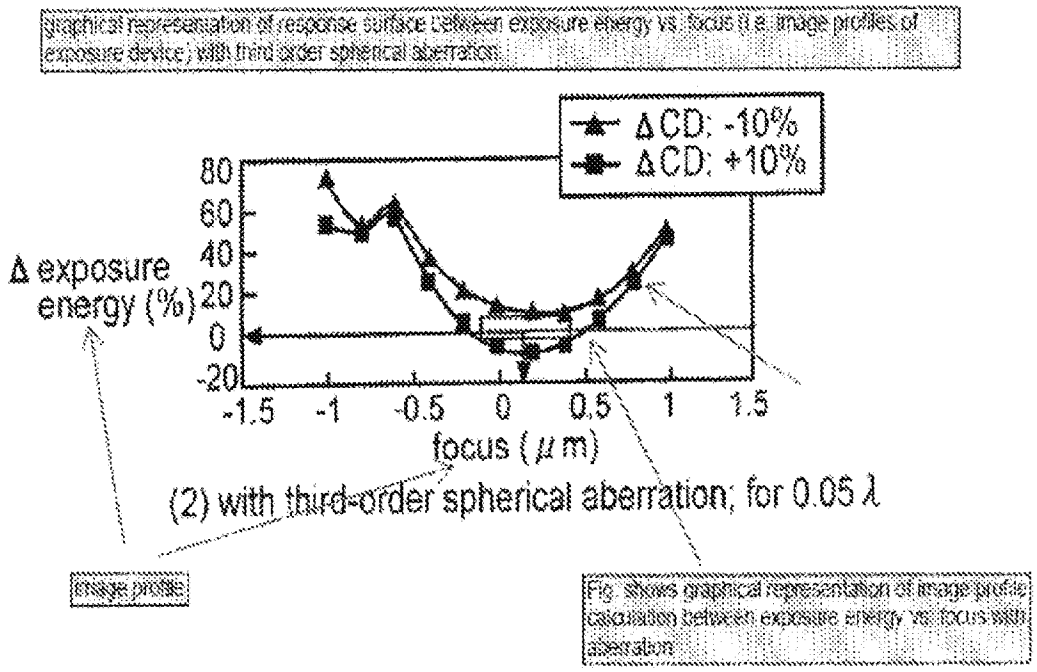
In the Response to Arguments section of the Office Action, the Examiner alludes to Miwa's FIG. 6 as being a three dimensional response surface relation. Without acquiescing in the accuracy of this assertion, Applicants submit that Miwa's FIG. 6 does not disclose *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations*, as recited in claim 1.

Instead, Miwa's FIG. 6 illustrates a method for measuring the aberration of a projection lens. The three dimensional surface plot in FIG. 6 (step 4) represents a measurement of the lens aberration at each x-y location on the lens. This three dimensional surface plot is merely measured data, and does not define a relationship between (i) variables of lens characteristics and (ii) an image profile of interest. Therefore, FIG. 6 does not disclose *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations*, as recited in claim 1.

Moreover, even assuming for arguments sake that the three dimensional surface plot in FIG. 6 (step 4) can reasonably be interpreted as a response surface functional relation between variables of lens characteristics and an image profile of interest, there is no mention in Miwa that the surface plot of FIG. 6 is built using the simulation calculations, much less the simulation calculations recited in claim 1. To the contrary, Miwa explicitly describes that this surface plot is created using measurements of the physical lens. Since Miwa does not disclose that the three dimensional surface plot in FIG. 6 (step 4) is built using the recited simulation calculations, Miwa's FIG. 6 cannot reasonably be said to read on *building response surface functional*

relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, as recited in claim 1.

Miwa also fails to disclose *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations*, as further recited in claim 1. The Examiner asserts that Miwa discloses this feature at FIG. 5 (Office Action, page 8). In particular, at page 3 of the Office Action, the Examiner provides the following annotated copy of a portion of Miwa's FIG. 5:



It is evident from these remarks that the Examiner is equating the graph in FIG. 5 to both the recited response surface functional relations and the recited image profile. However, this interpretation is not consistent with the language of claim 1. Claim 1 recites calculating the image profile using the specified aberration values of a lens in conjunction with the response surface functional relations. It is impossible for the single graph (e.g., Miwa's FIG. 5) to be both the response surface functional relations and the image profile, since the plain language of the claim requires that the image profile be calculated using the response surface functional relations and the recited image profile.

Additionally, at page 8 of the Office Action, the Examiner states:

> (See: Fig. 5 shows the response surface functional relation between exposure energy and the focus offset due to a third order spherical aberration).
>
> calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations using the processor of the one or more computing devices (Fig. 5 shows the set of data sample points are representing the calculation between exposure energy vs. focus offset (i.e. image profiles) within a range of (+/-) 10 with specified aberration (i.e. 0.05) in conjunction with the response).

Thus, the Examiner is explicitly stating that FIG. 5 shows the response surface functional relations. Based on this interpretation by the Examiner, in order for Miwa to read on the recitation *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations,* Miwa would necessarily have to disclose using the graph of FIG. 5 to calculate an image profile. Put another way, given the Examiner's interpretation that FIG. 5 shows the response surface functional relations, Miwa would have to use the data shown in FIG. 5 to calculate the image profile in order to read on the recitation of *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations.* However, Miwa does not disclose calculating an image profile **using** the graph in FIG. 5. In fact, Miwa does not disclose calculating anything using the graph in FIG. 5. Instead, the data plotted in FIG. 5 merely demonstrates that exposure energy and focus offset may fluctuate based on different aberrations. However, there is no mention of subsequently using the graph of FIG. 5 to calculate anything, much less an image profile. Therefore, Miwa does not disclose *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations,* as further recited in claim 1. Therefore, Miwa does not disclose all of the features of claim 1 and does not anticipate claim 1.

Independent Claims 46 and 47

Independent claim 46 recites:

> 46. A system for providing optimal image profiles through the optimization of specified aberration components, according to their associated impact upon image profile, comprising:
>
> means for performing simulation calculations for various levels for each aberration component using image configuration characteristic data;
>
> means for building response surface functional relations between variables of lens characteristics using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component;
>
> means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations; and
>
> means for applying the aberrated image profile estimates in an optimization calculation method which judges image profile information against defined criteria as part of a lens adjustment optimization calculation.

Also, independent claim 47 recites:

> 47. A tangibly-embodied machine readable medium containing code operable to adjust a lens, comprising at least one module for:
>
> performing simulation calculations for various levels for each aberration component using image configuration characteristic data;
>
> building response surface functional relations between variables of lens characteristics using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component; and
>
> calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations.

Applicants submit that Miwa does not disclose the combinations of features recited in claims 46 and 47. More specifically, Miwa does not disclose *the response surface functional relations are based on a value of an aberration component*. As discussed *supra* with respect to claim 1, Miwa discloses response surface functions when describing the Aida prior art (see, e.g., Miwa col. 2). However, Miwa does not disclose that these response surface functions are associated with an aberration component. To the contrary, Miwa is silent with respect to

aberration components when describing Aida's response surface functions. Therefore, Miwa does not disclose *the response surface functional relations are based on a value of an aberration component*, as recited in claims 46 and 47.

Furthermore, Miwa does not disclose *means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*, as recited in claim 46, or *calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*, as recited in claim 47. Miwa discloses calculating exposure energy and focus offset using the response surface functions. Miwa also separately discloses aberration values. However, Miwa does not disclose evaluating aberration values in relation to the response surface functions. Therefore, Miwa cannot reasonably be construed as disclosing calculating exposure energy and focus offset evaluating aberration values in relation to the response surface functions. As such, Miwa does not disclose *means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*, as recited in claim 46, or *calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*, as recited in claim 47.

Dependent Claims 2 – 6, 9 – 13, 15, 21 – 27 and 48

For the above-noted reasons, Applicants submit that Miwa does not disclose all of the features of independent claims 1, 46, and 47. Claims 2 – 6, 9 – 13, 15, 21 – 27 and 48 depend from independent claims 1 and 47, respectively, and are distinguishable from Miwa for at least the same reasons as the respective base claims. Moreover, Miwa does not disclose all of the features of these dependent claims.

Claim 15

For example, claim 15 depends from claim 1 and additionally recites *the performing simulation calculations for various levels for each aberration component comprises performing a full simulation calculation, and the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile*. The Examiner asserts that Miwa

discloses performing a full simulation calculation at lines 60-67 of col. 6 and FIG. 5 (Office Action, page 4). The Examiner further states at page 4 of the Office Action:

> The limitation of "calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile" is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure.

Applicants respectfully disagree with the rejection of claim 15 for the following reasons. First, it is improper for the Examiner to simply ignore the recitation *the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile.* Contrary to the Examiner's assertions, this recitation does not "merely recite the purpose of a process or the intended use of a structure." Instead, this recitation clearly recites how a step of a process is performed. Reciting how something is performed is not the same as reciting the purpose of a process. Therefore, the Examiner is not free to simply disregard this recitation of claim 15. Instead, the Examiner must consider this recitation for what it fairly conveys to one of ordinary skill in the art.

In any event, Miwa does not disclose calculating an image profile without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile. In contrast to Miwa, exemplary embodiments of the claimed invention, an image profile for a specified set of aberration values is calculated using response surfaces instead of performing a full simulation each time a new set of aberration values is received. More specifically, in embodiments, a setup phase involves performing full image simulations in order to create the response surfaces. However, this computationally intensive setup phase is only performed once, i.e., to create the response surfaces. After the setup phase, an image profile for a lens may be calculated using a specified set of aberration values and the response surfaces, without having to perform the computationally intensive full image simulation again. In this manner, implementations of the invention reduce the time and computation required in evaluating a new lens adjustment. This is described, for example, in

paragraphs 0080-0082, 0095, and 0107-0111 of Applicants' published application (i.e., U.S. Pub. No. 2006/0066841).

Miwa, on the other hand, does not disclose calculating an image profile without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile. Instead, in the description of Miwa's inventive system and method, Miwa does not specify the manner in which the image simulations are calculated. That is, in Miwa's invention, only the inputs (i.e., data values representing a given exposure tool's current state of performance) and the outputs (i.e., the process window) are specified; however, the calculation method for getting from the inputs to the outputs is not disclosed. Therefore, Miwa does not disclose recites *the performing simulation calculations for various levels for each aberration component comprises performing a full simulation calculation, and the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile*, as recited in claim 15.

Claim 27

Claim 27 depends from claim 1 and additionally recites *the calculating step is performed using a linear equation using fixed functions with coefficients determined in the building step.* The Examiner asserts that Miwa discloses this feature at col. 6, lines 60-67 and FIG. 5. Applicants disagree.

Contrary to the Examiner's assertions, Miwa makes no mention whatsoever of a using a linear equation using fixed functions. In fact, Miwa does not even disclose a linear equation. therefore, Miwa cannot be said to anticipate claim 27.

Accordingly, Applicant requests the §102 rejection of claims 1 – 6, 9 – 13, 15, 21 – 27 and 46 – 48 be withdrawn.

35 U.S.C. § 103 Rejections

Claims 7, 8, 14, 28 and 29 are rejected under 35 U.S.C. §103(a) as being unpatentable over Miwa in view of US Patent No. 6,493,063 issued to Seltmann et al. ("Seltmann"). Claims 42 – 45 are rejected under 35 U.S.C. §103(a) as being unpatentable over Miwa in view of US Patent No. 5,528,118 issued to Lee et al. ("Lee"). These rejections are respectfully traversed.

To establish a *prima facie* case of obviousness, all claim limitations must be taught or suggested by the prior art. *See, In re Royka*, 490 F.2d 981, 985, 180 USPQ 580, 583 (CCPA 1974); *see also, In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).[1] If the prior art reference(s) do not teach or suggest all of the claim limitations, Office personnel must explain why the differences between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art (MPEP 2141). Applicants submit that no proper combination of the applied art teaches or suggests each and every feature of the claimed invention.

Claims 7, 8, 14, and 28-29 in view of Miwa and Seltmann

Claims 7, 8, 14, and 28-29 depend from independent claim 1 and are distinguishable from the applied art at least for the same reasons as claim 1. Seltmann does not cure the deficiencies of Miwa with respect to claim 1 because Seltmann does not teach or suggest disclose: (i) *building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component*; or (ii) *calculating an image profile using the specified aberration values in conjunction with the response surface functional relations using the processor of the one or more computing devices*, as recited in claim 1. Nor has the Examiner relied on Seltmann to teach these features. As such, the applied art does not teach the combination of features recited in claim 1, from which claims 7, 8, 14, and 28-29 depend. Therefore, by definition, the applied art does not teach or suggest the combinations of features recited in claims 7, 8, 14, and 28-29, and does not render these claims unpatentable.

Accordingly, Applicant respectfully requests the §103 rejection of claims 7, 8, 14, and 28-29 be withdrawn.

Claims 42-45 in view of Miwa and Lee

Independent claim 42 recites:

> 42. An exposure apparatus, comprising:

[1] While the *KSR* court rejected a rigid application of the teaching, suggestion, or motivation ("TSM") test in an obviousness inquiry, the [Supreme] Court acknowledged the importance of identifying "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does" in an obviousness determination. *Takeda Chemical Industries, Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1356-1357 (Fed. Cir. 2007) (quoting *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007)).

an illumination system that projects radiant energy through a mask pattern on a reticle R that is supported by and scanned using a wafer positioning stage;

at least one linear motor that positions the wafer positioning stage;

a system for providing optimal image profiling, including:

means for providing image configuration characteristic data;

means for performing simulation calculations for various levels for each aberration component using the image configuration characteristic data;

means for building response surface functional relations between variables of lens characteristics associated with the image configuration characteristic data using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component; and

means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations.

Applicants submit that no proper combination of Miwa and Lee teaches the combination of features recited in independent claim 42. More specifically, neither Miwa nor Lee teaches: (i) *means for building response surface functional relations between variables of lens characteristics associated with the image configuration characteristic data using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component*; or (ii) *means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*, as recited in claim 42.

As discussed *supra* with respect to claims 1, 46, and 47, Miwa does not disclose or suggest *the response surface functional relations are based on a value of an aberration component*. Moreover, as discussed above with respect to claims 46 and 47, Miwa does not disclose or suggest *calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations*. Therefore, Miwa does not disclose all of the features of claim 42.

Lee does not cure the deficiencies of Miwa with respect to claim 42 because Lee does not teach or suggest disclose: (i) *means for building response surface functional relations between variables of lens characteristics associated with the image configuration characteristic data*

using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component; or (ii) *means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations.* Nor has the Examiner relied on Lee to teach these features. Instead, the Examiner relied on Lee for a teaching of a linear motor.

As such, the applied art does not teach the combination of features recited in independent claim 42, and does not render claim 42 unpatentable. Claims 43-45 depend from independent claim 42 and are distinguishable from the applied art at least for the same reasons as claim 42.

Accordingly, Applicant respectfully requests the §103 rejection of claims 43-45 be withdrawn.

New Claim

Claim 49 is added by this amendment and is allowable based on its dependency from independent claim 1. Moreover, claim 49 recites:

> 49. The method of claim 1, wherein the calculating step is performed after the building step such that the response surface functional relations that are used in the calculating the image profile are built prior to the image profile being calculated.

As noted above with respect to claim 1, the Examiner asserts that the data plotted in Miwa's FIG. 5 represents both the response surface functional relations and the image profile. However, this interpretation is impossible to reconcile with the language of new claim 49. In particular, new claim 49 recites that the calculating step is performed after the building step such that the response surface functional relations that are used in the calculating the image profile are built prior to the image profile being calculated. A single data plot, such as that shown in Miwa's FIG. 5, cannot meet the temporal requirements recited in claim 49. Therefore, Miwa cannot be said to render claim 49 unpatentable.

CONCLUSION

In view of the foregoing remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2478.

Respectfully submitted,
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